U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

EERE-Funded Patents have had a Strong Influence on Subsequent Innovations in the Research Community

- **Almost 9,000 EERE-funded patents to date**
- **EERE patenting increased sharply after 2010**
- **EERE patents cited 67% more frequently than the norm for 20 EERE research portfolios**
- **EERE funding has helped fill research gaps not addressed by leading research organizations**

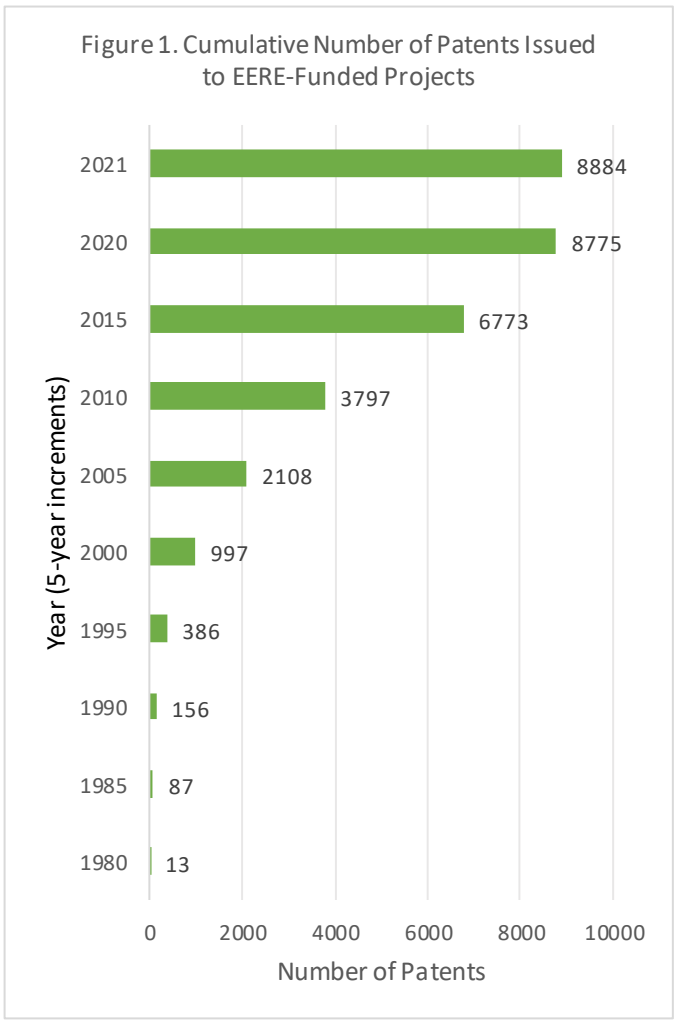
More than 8,800 issued EERE-funded patents and counting.

From 1976 to June 2021, 8,884 U.S., European, and world patents were issued based on R&D projects at least partially funded by the Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE). These patents are the result of research conducted by EERE-funded private companies, Small Business Innovation Research (SBIR) awardees, and national laboratories.

This is a conservative count of total EERE patents because there are an unknown number of national lab patents that EERE may have funded.

EERE-funded patent activity increased sharply after 2010.

Figure 1. Cumulative Number of Patents Issued to EERE-Funded Projects



**Data was last collected in June 2021 and thus the last bar in the chart does not reflect the 5-year period.*

Patents funded under 20 EERE R&D portfolios have a wider-than-average reach and impact.

A study of 20 EERE research portfolios traced the influence of 5,988 EERE-funded patents. These portfolios correspond to approximately 60% of EERE R&D funding from 1976 to 2018. The portfolios are listed below.

Additive Manufacturing	Solid State Lighting	Advanced Batteries
Algal Systems	Geothermal Energy	Advanced Combustion
Bioenergy Conversion	Fuel Cells	Lightweight Materials
Bioenergy Feedstocks	Hydrogen Production	Propulsion Materials
Domestic Appliances	Hydrogen Storage	Marine Hydrokinetics
HVAC	Solar Photovoltaics	Wind Energy
Water Heating	Concentrating Solar Power	

The 5,988 EERE-funded patents represent up to 3% of patent families in their respective technology areas in each of the 20 portfolios, yet these patents have been cited 67% more frequently by subsequent patents than expected, given their age and technology. This high average rate of citation indicates that EERE patents have had a strong influence on subsequent technology innovations.

A "patent family" contains all patents resulting from the same initial application (named the priority application). On average, about 10% of leading research organizations' patent families are linked via citations to earlier EERE-funded patents. For several EERE-funded research portfolios, more than 20% of leading company patent families are linked to earlier EERE patents.

EERE funding has helped fill research gaps not addressed by leading research organizations.

Research gaps are defined as specific technology areas where EERE-funded patents have a greater focus on specific subjects than the patents of leading research organizations in the corresponding technology. There are many instances where EERE funding is helping to fill research gaps.

Examples include large-scale concentrating solar power installations; polymeric electrolytes; membrane electrode assemblies; platinum-based alloys; organic solid-state devices; exhaust gas recirculation; carbon fibers; cell lysis; ethanol production; comminution of crops and wood; absorption and magnetic refrigeration; hydrogen storage in metals; and downhole drilling technologies.

Sources:

- The Influence of Patents in Twenty R&D Portfolios Funded by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, by 1790 Analytics LLC. 2022 https://www.energy.gov/eere/analysis/influence-patents-twenty-rd-portfolios-funded-us-department-energys-office-energy
- Data for 8,884 patents is available from EERE upon request.

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DOE/EE-2700 • March 2023